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TINCTURE OF FERRIC CHLORIDE.

By Joseph W. England, Ph.G.

Read at the Pharmaceutical Meeting, February 17, 1884.

In the ebb and flow of pharmaceutic progress, it is interesting and instructive to note the strange and passing changes in its history; the rise and fall of its many so-called infallible agencies, without whose supposed aid human effort to combat disease was thought fruitless; but time's crucial test of the survival of the fittest has left but few, comparatively, of the many brought forth from nature's hiding-places, and these few have, through their inherent worth and true usefulness in certain morbid physical conditions, not only retained their original hold upon popular favor, but despite the introduction of new fancies with asserted, similar properties, advanced still higher in popular professional opinion and general application. Enrolled among these few there is one, which we will consider, that may be fairly and rightly classed within its ranks as a fit representative; for without question its useful, characteristic qualities have been so long recognized, that no studied words are needed to sound its praise; and that one is Tinctura Ferri Chloridi.

Upon entering this frequently trodden path of pharmaceutical literature, the writer is fully aware of the many able investigations which have preceded his effort; but as accuracy in the statement of fact, irrespective of source, is the main element in the upbuilding of scientific knowledge, any statement or suggestion which promotes that end, enhances the real intrinsic value of the truth already known and paves the way to more profitable exertions in the future. With an earnest desire to seek and grasp the real, underlying features of the subject under consideration, and fully appreciating the high value of previous works in this direction, the subject must necessarily partake, partially at least, of the nature of a review of past and present methods, with an

account of their discrepancies and advantages, and the offering of suggestions for improvements in the light of newly discovered facts.

Our accepted authority[1] of 1850, ordered the preparation of the tincture by saturating a definite quantity of hydrochloric acid with subcarbonate of iron, filtering and making up to the requisite volume with sufficient alcohol. This solution contained, generally, both ferrous and ferric chlorides in varying proportions, and when exposed to atmospheric influences, gradually became oxidized with the deposition of insoluble ferric oxide; no free acid (HCl) being present to prevent the change.

These objections were, in a measure, remedied by the next revision (U. S. P., 1860); but it remained for the following issue (U. S. P., 1870) to divide its manner of making into two separate and distinct changes, which consisted in the introduction of two officinal products. The first of these was to be known as "Liquor Ferri Chloridi," and the second, which was to be made from the first with alcohol, as "Tinctura Ferri Chloridi." The Pharmacopœia of 1880 retained these later features, except that in accordance with the general plan of the work, parts by weight were substituted, in the formulæ, for the volumetric measurement of the liquids.

The present pharmacopœial directions for the preparation of the liquor, consist, first, in the formation of ferrous chloride with diluted hydrochloric acid and metallic iron, and then in the oxidation of this ferrous chloride, in slightly acid (HCl) solution, into the ferric state with nitric acid, and the direction to remove any excess of the latter reagent by heat. The tincture is ordered to be made by simple admixture of the liquor and alcohol in definite parts by weight and allowing the mixed liquids to stand in a closed vessel for "not less than three months prior to use." The intent of the latter action, it is said, is to insure the full production of chlorinated ethers.

Mr. R. Rother, through the "Journal,"[2] presents, in a very able and interesting communication, some critical remarks upon "Ferric Chlorides" in general and the "Liquor" (U. S. P., 1880) and "Tincture" (U. S. P., 1880) in particular. He claims, principally, that the present method pursued in preparing the liquor is radically wrong and defective in structure, if its object is to obtain extreme purity of the finished product, through the impossibility of evaporating off the excess of nitric

[1] U. S. Pharmacopœia.

[2] "American Journal of Pharmacy," August, 1884, p. 407.

acid or even nitrogen oxides formed from its decomposition; and that the excess of hydrochloric acid present in the liquor in no way tends toward the etherization of the alcohol in making the tincture, and lastly, that this result, *i. e.*, the etherizing of the alcohol, depends upon the presence of lower oxides of nitrogen arising from decomposed nitric acid.

In regard to the unremoved excess of nitric acid in the liquor, a few remarks confirming the statement of its existence there, are in order. To further this end, the following plan was adopted: To a definite quantity of the officinal liquor, silver nitrate was added to precipitate all chlorides; care being used to avoid any excess of the precipitant. The filtered liquid, which was strongly acid in its reaction with litmus, readily liberated free iodine on the addition of a very small quantity of potassium iodide. To ascertain whether this acid was nitrous or nitric acid, several volumes of certain diluted acids, equal in quantity to that of the liquor originally used, were each taken separately and exposed to an action, if possible, upon potassium iodide in the same amount as that used above, and the ensuing reaction or non-reaction used as a basis of comparison. When this was done, diluted hydrochloric acid (U. S. P., 1880) had no decomposing effect upon the iodide, neither had diluted nitric acid, so that when the so-called pure nitrous acid of commerce (really a mixture of both nitrous and nitric acids), very largely diluted with water, was added in small amounts and iodine freely liberated, the evidence given clearly showed the presence in the liquor of free nitrous acid alone. The method used is simply a modification of the general test for nitrites in the presence of nitrates, and depends for its value upon the fact that free nitrous acid in dilute solution quickly decomposes potassium iodide with the setting free of its iodine, while free nitric acid, under like conditions, exerts a totally negative influence.

For the moment, let us turn our attention towards certain calculations based upon the officinal formulæ, showing the amounts of the two acids ordered and that actually required. Since the solution contains 37·8 parts of ferric chloride in each 100 parts, and since it is found that 324·2 parts of ferric chloride require 684·6 parts of 31·9 per cent. hydrochloric acid, then 37·8 parts of ferric chloride, the amount officinally desired, would require a less quantity. It is so expressed, and 80 parts, in short, is the result indicating the amount actually used

during the process, leaving an excess of 6 parts of officinal hydrochloric acid, thus:

$$324{\cdot}2 : 37{\cdot}8 :: (218{\cdot}4 \div {\cdot}319 =) 684{\cdot}6 : 79{\cdot}82.$$

Concerning the nitric acid, we say that, if 972·6 parts of ferric chloride demand for its oxidation from the ferrous state 181·5 parts of 69·4 per cent. nitric acid, then 37·8 parts of ferric chloride would require less, or when found 7·05 parts. The amount of HNO_3 officinally ordered is 8 parts, leaving a minimum unused excess of 1 part, thus:

$$972{\cdot}6 : 37{\cdot}8 :: (126 \div {\cdot}694 =) 181{\cdot}5 : 7{\cdot}05.$$

Now, as the amount of nitric acid used in the iron valeation is theoretically, and in practice, admittedly in excess of the amount actually demanded for that purpose alone, it is clearly evident, upon examination, that, independently of the facts involved in the valeation, so called, there is another totally separate chemical change taking place, which, apparently, has failed to receive the notice or excite the attention that its high value demands. The real underlying feature of the whole case seems to be that immediately after we have oxidized the iron compound we also change the chemical character of the excess of hydrochloric acid present, in the same manner as we do when making nitrohydrochloric acid, through the presence of the unremoved excess of nitric acid. The reaction is, first:

$$2HNO_3 + 6HCl = N_2O_2Cl_2 + 2Cl_2 + 4H_2O;$$

or, plainly expressed, the change consists, essentially, in the mutual decomposition of both nitric and hydrochloric acids, with the formation of chloronitrous anhydride, $N_2O_2Cl_2$ (a chlorine derivative of nitrous anhydride, (N_2O_3), or the so-called nitrous acid gas, formed by the simple replacement in the molecule of one bivalent oxygen atom with two univalent chlorine atoms), free chlorine gas and water. The free chlorine is volatilized by heat, the solution being a diluted one; and, since chloronitrous anhydride, ($N_2O_2Cl_2$), readily decomposes on dilution into nitrous anhydride and free hydrochloric acid, the following secondary change ensues:

$$2N_2O_2Cl_2 + 2H_2O = 2N_2O_3 + 4HCl:$$

or, in other words, the chloro-anhydride is decomposed by water, with the abstraction of its chlorine atoms to form hydrochloric acid with

the hydrogen of the decomposed water, while the freed oxygen atoms of the latter unite with those of the altered anhydride to nitrous anhydride (N_2O_3), which, through its strong affinity for moisture, quickly absorbs one molecule of water to form the more stable nitrous acid (HNO_2).

If, according to the Pharmacopœia,[1] 1 part of nitric acid requires $3\frac{3}{4}$ parts of hydrochloric acid for mutual decomposition in making nitrohydrochloric acid, it is evident that the excess of 6 parts of HCl present in the liquor is only partially changed by the excess of 1 part of HNO_3, and the remaining $2\frac{1}{4}$ parts of hydrochloric acid must remain free and unchanged, because of the insufficiency of free nitric acid.

Now, in the simple decomposition of the two acids previously mentioned we have a ready solution for the main cause of the production of ethyl nitrite, since it is well known that nitrous acid, or even nitrous anhydride, when brought in contact with alcohol, readily generates that ether.

The claim that the liquor forms nitrohydrochloric acid needs no labored argument to prove, since the presence of free nitrous acid in the commercial liquid has been determined in a number of samples by the author in following the modified test for nitrous acid previously mentioned. The occasional presence of traces of free chlorine has also been observed through the ready solubility of gold leaf in the liquid. In regard to the free chlorine, however, it is fair to assume that it is almost entirely dissipated on the application of heat.

Mr. Rother has constructed a formula for the "Liquor," founded upon the oxidizing properties of chloric acid, resulting from the decomposition of barium chlorate with acid, upon ferrous chloride in acid solution, the barium being precipitated with sulphuric acid.

As a general rule, the reception and permanency of any new pharmaceutical process is, in the main, dependent upon its simplicity of structure and its freedom or non-liability of contaminating impurities arising from defective modes of procedure. There is no doubt that, under exact conditions and in careful hands, this process would give good results; but if, in the making of this product, there is danger, either from the explosive character of the chloric acid formed, or the liability to retain a poisonous impurity in the form of a soluble, unpre-

[1] U. S. P., Acidum Nitrohydrochloricum, p. 18.

cipitated barium salt, in case the precipitant is weaker than the Pharmacopœial strength demanded, its replacement by simpler methods, with safe and equally valuable results, will not be long deferred.

With the submitting of the previously recorded statements, the author would also desire to present a formula for the preparation of the "Liquor," which in his hands has yielded safe and valuable results. The change in working involves no complicated methods, but simply consists, first in the formation of ferrous chloride with metallic iron and diluted hydrochloric acid, as heretofore, and then in the valeation of this ferrous salt, by exposing its heated, acidulated (HCl) solution to the oxidizing action of gaseous chlorine in its passage through the liquid. Any excess of the gaseous element may afterwards be readily removed by the use of heat, or, if so desired, by the passage of a current of air through the solution. The use of chlorine gas, in this connection, as an oxidizer, is only a new application of the old and well-known method of preparing the normal ferric chloride solution employed in chemical analysis where an excess of free acid (HCl) is not wished. On this occasion, however, an excess of HCl is desirable, as a means of insuring permanency of composition.

FORMULA.

Iron, in the form of fine wire, and cut in small pieces, 15 parts (3¾ oz. av.); hydrochloric acid, 59 parts (14¾ oz. av.); chlorine gas, distilled water, each a sufficient quantity to make 100 parts (25 oz. av.). Place the iron wire in a capacious flask, and pour upon it 54 parts (13½ oz. av.) of hydrochloric acid, previously diluted with 25 parts (6¼ oz. av., or 6 fluidounces) of distilled water. Heat the liquid, slowly, until the reaction is ended, and effervescence ceases; then rapidly heat to the boiling point, filter through paper, and, having rinsed the flask and residue with a little boiling distilled water, pass the washings through the filter. To the filtrate add, immediately, 5 parts (1¼ oz. av.) of hydrochloric acid, followed by the addition of 20 parts (5 oz. av.) of boiling distilled water. Keep the liquid nearly boiling, and pass through it a stream of gaseous chlorine (generated in the usual way), agitating occasionally, until a small portion, tested with freshly prepared test solution of potassium ferricyanide, gives no indication of the existence of a ferrous compound by producing a blue precipitate. Lastly, add, after any free chlorine present has been

removed by heat, sufficient distilled water to make the whole produc weigh 100 parts (25 oz. av.).

The "Tincture" may be made, if so desired, by the simple admixture of this new liquor with alcohol in the proportion of 35 parts to 65 parts, as of old, and mixing the liquids; no previous standing before medicinal employment being necessary. But concerning the tincture, more especially the officinal one, there are quite a number of views held regarding its utility and value over a liquor of similar strength, as questionable. The "National Dispensatory," p. 901, in speaking of the liquor (U. S. P., 1880), says of it, that "It is not altered by exposure to sunlight, except in the presence of various organic matters, by which the salt is partially reduced to ferrous chloride" and again, the same authority, under the tincture (U. S. P., 1880), p. 1526, says, that "Notwithstanding this gradual reduction (in the tincture) is well known, the U. S. P. requires the tincture on the addition of freshly prepared solution of potassium ferricyanide, to acquire merely a greenish-brown color, without a trace of blue, which is simply an impossibility." In further corroboration of the reducing action of alcohol and sunlight combined on ferric chloride solution, when prepared by the officinal method, Professor Attfield, in the last edition of his "Chemistry," p. 146, in commenting upon the tincture (U. S. P., 1880), remarks, that "The spirit in the tincture is unnecessary, useless and deleterious; for it acts neither as a special solvent nor as a preservative, the offices usually performed by alcohol and unless the liquid contains excess of acid, decomposes the ferric chloride and causes the formation of an insoluble oxychloride of iron. Even if the tincture be acid it slowly loses color; ferrous chloride and chlorinated etherial bodies being formed. A liquor of similar strength is doubtless destined to displace the tincture altogether." Further evidence in conformation of these views, is given by Mr. R. Rother in his paper on "Ferric Chlorides"[1] to which previous reference has been made, when he says, that "In regard to the officinal proportion of alcohol in the tincture, it may be said that it is unnecessarily great. Whilst a moderate amount, say 35 per cent., may be beneficial, any large excess may be fairly judged as a species of impurity, aside from being a positive waste." Now the evidence adduced from these extracts and also from the remarks previously made is, that the prepara-

[1] "American Journal of Pharmacy," August, 1884, p. 409.

tion of the officinal tincture, and its employment, was radically wrong if a strictly definite standard solution of the chemical was desired, and there is only one feature in its use, that could be construed as favorable evidence toward its continuance and that is, that the formation of nitrous ether in the old tincture may have had more or less to do therapeutically with its peculiar diuretic action on the human system, but this fact need not stand in the way, for the simple reason that if such belief is a true one, a more definite quantity of spirit of nitrous ether (U. S. P., 1880), may be prescribed in its place with a new liquor, than was possible to obtain in the old tincture. With a new liquor, a formula might be constructed with spirit as of old, and it would possibly remain unchanged, but that fact does not nullify the pertinency of the statement, that the employment of alcohol is both unnecessary and useless, and, serving as it does no special good, its use may be justly condemned as a positive waste.

The better way, it would seem, in order to secure the fittest representative of the article in question, would be to receive the suggestion of a diluted liquor and advocate its adoption by the Pharmacopœial Committee of Revision in its next session; that method of adoption consisting in the recognition of one new "Liquor Ferri Chloridi," having the same iron strength as our present tincture, and also adding, if wished, 5 per cent. of the officinal spirit of nitrous ether in lieu of ethyl nitrite; and the total discarding of the present "liquor" and "tincture" as both useless and unnecessary. In this way all error and possible confusion, incidental to the changes, could be overcome, and the general usefulness of the chloride continued in active force.

Samples of the several liquids previously referred to are presented. The first one is the officinal liquor—a 37·8 per cent. solution of ferric chloride. It is a deep reddish-brown liquid, having an acid strongly styptic taste and an acid reaction. The second is a tincture, U. S. P. strength. It is a yellowish-brown liquid, destitute of etherial odor, possessing an astringent styptic taste and an acid reaction. The third is a diluted liquor of tincture strength. It is a bright yellowish liquid, acid in reaction and of styptic taste. The fourth is a diluted liquor, tincture strength, containing 5 per cent. of spirit of nitrous ether (U. S. P., 1880), which has been added to it in the cold. A dark reddish-brown liquid of etherial odor, which on standing, eventually, becomes of lighter color. Properties, the same in general, as the preceding liquids. The fifth and last is a diluted liquor, in which the 5 per

cent. of added spirit of nitrous ether, has been slowly poured into a boiling solution of ferric chloride and then diluted to the proper quantity of liquid.

In closing it may be well to make some remarks of the peculiar action exercised by nitrous acid, or certain of its derivatives upon solutions of ferric chloride prepared by the chlorine process. When the diluted liquor with 5 per cent. of spirit of nitrous ether was prepared, an immediate darkening of the liquid was noticed, which, upon the application of heat, assumed a much lighter shade. A possible theory of the cause of this darkening in color is that a ferric nitrite may be formed from the added nitrous compound, which, upon heating, is decomposed by the free hydrochloric acid present, with the formation of free nitrous acid and ferric chloride.

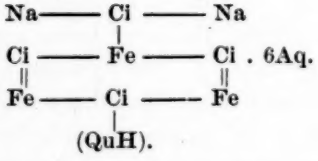
CITRATE OF IRON AND QUININE.

By R. Rother.

According to the Pharmacopœia the official trihydrous quinine loses two ms. of water at 100° C, and the remaining third m. at 125° C. If this be so the quinine dried at the former temperature cannot be the anhydrous alkaloid. Yet in the formula for citrate of iron and quinine it is implied that this is the case. The writer, however, doubts this, and hence assumes that this compound contains 12 per cent. of monohydrous quinine, which would give the substance, chemically considered, a molecular weight of 2,850. This will indicate one m. of quinine monohydrate to about 9·22 ms. of ferric citrate. It is then probably an indefinite mixture of ferric hydrocitrate, ferric citrate and an undetermined quinio-ferric citrate held in some kind of chemical union by the two former salts. A plausible analogy for this view is found in what may be termed an acid ferric citrate. When one m. of ferric citrate or 2·72 grammes is mixed with one m. of citric acid, or 2.10 grammes, then heated with some water until dissolved, finally evaporated and dried at a gentle heat, a product weighing 4·91 grammes is obtained. This result shows that a definite compound is formed having the formula $FeCi.H_3Ci.3Aq.$, with a molecular weight of 491. The salt is extremely soluble but non-deliquescent. Its color is of a lighter tint than ferric citrate. It becomes soft on heating, and although friable when cold, it is too tenacious for scaling. By replacing all the basic hydrogen with sodium or other bases, very characteristic

green colored double salts are formed ("American Journal Pharmacy," March, 1883).

In the paper referred to a triquinic substitution was noted. When but two or only one replacement is made the resinous and insoluble nature becomes successively less pronounced. The interposition of sodium modifies these features still further, so that when two sodic and one quinic radicle are present a compound of considerable infusibility and solubility results. When at this stage the ferric citrate is doubled the solubility is again greatly enhanced. But the tripling of the ferric citrate touches the climax in an unlimited capacity for solution. The double salt thereby obtained is however perfectly nondeliquescent. It has a fine apple green tint, and is readily procured in magnificent and permanent scales. Although promptly and profusely soluble in cold or hot water, it is but sparingly soluble in alcohol. It is also an invariably definite compound. For when in preparing it three ms., or 8·16 grams of ferric citrate, one m., or 2·10 grams of citric acid, two ms., or 1·68 grams of sodium bicarbonate, and one m., or 3·78 grams of trihydrous quinine are united in the presence of water, evaported and then dried at a gentle heat, a product weighing 14·03 grams is obtained. This result indicates that the molecular weight of this new salt is 1,403, and that its empirical formula is $3(FeCi).Na_2(QuH)Ci.6Aq.$, and its structural formula



Contrasted in this expression the proportion of quinine seems insignificant. Compared however by weight, it is as 378 to 1,403, that is the salt contains 27 per cent. of trihydrous quinine.

The corresponding potassium salt is equally elegant and soluble. When 8·16 grams of ferric citrate, 2·10 grams of citric acid, 2·00 grams of potassium bicarbonate, and 3·78 grams of trihydrous quinine are united as in case of the sodium salt, the product weighs 13·81 grams. This result shows that the composition of the salt is $3(FeCi).K_2(QuH)Ci.3Aq.$, and its molecular weight 1,381. Accordingly the percentage of quinine trihydrite is about 27·4, which corresponds to nearly 31·3 per cent. of quinium sulphate.

An analogous sodium salt is produced when the quinine is replaced

by an additional sodic radicle. In appearance it differs only in having a deeper shade of apple green. It is equally soluble, nondeliquescent, and superbly scaled. Its definite character is shown that when three ms., or 8·16 grams of ferric citrate, one m., or 2·10 grams of citric acid and three ms., or 2·52 grams of sodium bicarbonate are mixed in the presence of water heated until combined, and then evaporated and dried at a gentle heat, a product is obtained weighing 11·01 grams. From this it appears that the formula of the salt is $3(FeCi).Na_3Ci.6Aq.$, and the molecular weight 1,101. It commends itself as a substitute for the now official ammonio-ferric citrate, over which it has various advantages.

Owing to the fact that in the construction of the new citrate of iron and quinium a quinium citrate would be in some respects superior to the alkaloid it became desirable to ascertain the composition of the three citrates, containing, respectively three, two and one quinic radicles.

The first one was therefore determined by uniting 3·78 grams of trihydrous quinine and ·70 grams of citric acid in contact with water, then evaporating and drying it at a gentle heat until the residue ceased to lose weight. The product weighed 4·96 grams, showing that the molecular weight is 1,488, and the formula $(QuH)_3Ci.18Aq.$

The second or diquinic citrate is obtained when 3·78 grams of trihydrous quinine and 1·05 grams of citric acid are united as in the first instance. The product weighs 4·65 grams. This result indicates that the formula of the salt is $(QuH)_2HCi.5Aq$, and the molecular weight 930. In regard to appearance and solubility this salt closely similates the triquinic citrate.

The third was found by a similar method to give from 3·78 grams of tribydrous quinine and 2·10 grams of citric acid a residue weighing 5·70 grams. Its molecular weight is therefore 570 and its formula $(QuH)H_2Ci.3Aq.$

When 3·78 grams of quinine trihydrite and 1·40 grams of citric acid are combined as in the three preceding cases the product weighs 5·12 grams. This result shows that the formula of the salt thus obtained is $(QuH)_3H_3Ci_2.10Aq$, and that its molecular weight is 1536. It is more crystalline and soluble than the first two of the preceding citrates, and less so than the third. This compound is not a mixture, but apparently a combination between a monoquinic citrate and a diquinic citrate molecule. But it is simpler to regard it as a combination

between a triquinic citrate and a citric acid molecule. This view would consider it a super acid quinium citrate. However, according to either construction, the union partakes of that subvalent nature wherein the chemical compact cannot be represented by unit bonds.

The first of these citrates is the least soluble of them and forms as a voluminous curdy mass.

The second has a more crystalline character and is also slightly more soluble.

The third crystallizes in voluminous collections of delicate satiny needles. It is by far the most soluble of these salts, imparting a very decided bluish fluorescence to the cold aqueous solution, and is much more freely soluble in hot water. Although this monoquinic citrate appears to be more soluble than the ordinary sulphate, it is remarkably less bitter. Besides the process already mentioned, it can also be prepared by double decomposition between 436 parts of diquinic sulphate and monosodic citrate derived from 210 parts of citric acid and 84 parts of sodium bicarbonate. The resulting magma is heated with sufficient water to dissolve it, and the solution set aside to crystallize. This method is, however, somewhat wasteful, owing to the marked solubility of this salt.

The monoquinic citrate is apparently the most practically applicable salt in the preparation of the new sodio-ferric quinium citrate. If not procurable as such in the market, it can be readily compounded by directly uniting the quinine and citric acid employed in the working formula of the double salt. As already intimated, the union is more speedily and easily effected by this manner of compounding than by the incorporation of the quinine last. The tendency of the alkaloid to fuse into resinous masses is, in the case of the new salt, by no means as pronounced as in the old official process, yet it can be wholly obviated as above suggested.

If the Pharmacopœia intends to employ anhydrous quinine in its formulas, it should not have adopted a hydrite at all. Had an anhydrite been directed, the operator would either have employed the trihydrous quinine in the proportion of 378 to 324 or he would have appropriately heated 378 parts of the trihydrite until only 324 parts remained.

The preparation of a pure trihydrous quinine is not so easy as it might seem. It is especially difficult when the sulphate is used. On pouring the solution of the acid sulphate into the alkaline precipitant

never so carefully, a portion of the sparingly soluble ordinary sulphate will always be entangled in the precipitated quinine. A perfect decomposition can only be effected by percolating a weak alkaline liquor through the collected magma until the filtrate no longer responds to ammonia. Contamination with precipitated quinium salts can, however, be obviated directly by employing quinium chloride in saturated cold solution. Since ordinarily a much larger proportion of alkali is needed to precipitate the quinine wholly, than simple equivalents, it follows that ammonia is not a desirable precipitant. Fixed caustic alkalis and disodic carbonate are preferable, as an excess dissolves no quinine, which happens in case of ammonia.

If heat were admissible the precipitation of quinine could be more easily performed. However by taking advantage of the fusibility of trihydrous quinine, a process is derived which renders this property for the production of anhydrous quinine very practicable. On depriving fused trihydrous quinine of its water by means of a properly regulated heat, a very friable residue of anhydrous quinine is left. Hence anhydrous quinine, in an appropriate official form, can be produced by heating together 8·72 grams or one m. of ordinary quinium sulphate, 5·72 grams or two ms. of disodic carbonate and about 50·00 cc. of water, until perfect decomposition of the sulphate is effected. On cooling, the alkaline solution is decanted from the hardened mass. This is well rinsed with cold water and then successively digested with small portions of water until the fused quinine is thoroughly washed. The mass is now heated at a properly regulated temperature until a friable residue of anhydrous quinine, weighing nearly 6·48 grams, remains.

From these various considerations, the following formula for the new sodio-ferric quinium citrate is derived:

Ferric citrate	8·16 grams
Citric acid	2·10 "
Sodium bicarbonate	1·68 "
Quinine trihydrite	3·78 "
or,	
Quinine anhydrite	3·24 "
Water, sufficient.	

Place the ferric citrate, sodium bicarbonate and 20·00 cc. of water into a porcelain capsule of convenient size, and apply heat, constantly stirring the mixture until perfect solution has resulted. Now place the quinine, citric acid and 20·00 cc. of water into a similar capsule,

and apply heat whilst stirring the mixture, until the combination is completed. Pour the solution into this magma, apply heat, and when all has dissolved, evaporate the solution at a moderate temperature, to a syrupy consistence, and spread it on glass plates to dry in the warm open air, so that the salt may form in scales.

THE DIASTATIC POWER OF CERTAIN EXTRACTS OF MALT.

By Albert B. Prescott.

In determining the starch-converting power of certain samples of extract of malt of the market, these samples having been obtained since December 1, 1884, from different retail drug stores in different towns in the interior of Michigan, with one sample of each brand obtained in Chicago, Illinois, I have obtained the following given results:

"MALTINE" OF THE MALTINE MANUFACTURING COMPANY.				"TROMMER'S EXTRACT OF MALT.			
No. 1 converts	9 to 10	parts starch.		No. 1 converts	18	parts starch.	
No. 2 "	8	"		No. 2 "	16	"	
No. 3 "	9 to 10	"		No. 3 "	17	"	
No. 4 "	8	"		No. 4 "	16	"	
No. 5 "	14	"		Average,	16¾	"	
No. 6 "	8	"					
No. 7 "	13	"					
Average	10 to 11	parts starch.					

The starch was weighed as dry starch, and rated in parts to one part of the malt extract. The concentration, one part of starch to twenty parts of water, and one part of malt extract diluted with water to four parts. The time of digestion, twenty minutes; the temperature, 60° to 64° C. The end-reaction, an extinction of the iodine and starch color in three minutes after the intermixture of the iodine with the digested starch (previously cooled).

One year ago, using the same method and conditions, I tested the starch-converting power of samples of "Maltine" and of "Trommer's Extract of Malt" obtained (in open market) in Ann Arbor only, and then found and reported that the "Maltine" converted 33 parts of starch, and the "Trommer's Extract of Malt" converted 16 parts of starch. And testing now again my retained samples obtained a year

ago, I find their converting power not changed, and my test results the same reported in January, 1884.

From the investigation now made, I am convinced that, as now furnished in Michigan, "Trommer's Extract of Malt" holds a nearly uniform power of converting 16 to 17 parts of starch, and that "Maltine" has a more variable power of converting a mean of 10 to 11 parts of starch. And I am convinced that the samples of "Maltine" I obtained in Ann Arbor, a year ago, were exceptional samples, as they had three times the starch-converting power possessed by the average "Maltine" of the Maltine Manufacturing Company supplied in Michigan for the past three months.

ANN ARBOR, MICHIGAN, January 6, 1885.

AN EXAMINATION OF BURDOCK FRUIT.

A CONTRIBUTION FROM THE CHEMICAL LABORATORY OF THE PHILADELPHIA COLLEGE OF PHARMACY.

BY HENRY TRIMBLE AND F. D. MACFARLAND.

Read at the Pharmaceutical Meeting, February 17, 1885.

The following analysis of the fruit of Lappa officinalis, while incomplete, gives, we believe, the important constituents of this drug. The moisture determined in the usual way was found to be 7·30 per cent., and the ash 5·34 per cent.

Ten grams reduced to No. 60 powder were thoroughly exhausted with petroleum spirit. This solution, on evaporation and heating to 110°C., was found to consist of a bland light yellow fixed oil, representing 15·4 per cent. of the fruit.

The following are some of the important characteristic reactions. With fuming nitric acid a brown color and aromatic odor, but not becoming solid. With strong sulphuric acid a brown color, becoming thick and syrupy. Exposed to the air in thin layers the oil solidifies. Alcohol and absolute alcohol do not dissolve it, but hot absolute alcohol, ether, chloroform and benzol are good solvents. The specific gravity is ·930, determined with a larger amount of the oil prepared from 75 grams of the drug. That portion of the original ten grams remaining after treatment with petroleum spirit was exhausted with ether which dissolved 1·15 per cent. of a resin soluble in alcohol. Absolute alcohol extracted from the remainder of the drug 12·6 per

cent. 8·3 per cent. being insoluble in water, appeared to be resin soluble in dilute alcohol; the remaining 4·3 per cent. were soluble in water and were examined for alkaloids. A small quantity of crystals separated on evaporating the chloroform solution of this aqueous portion, first made alkaline with potassium hydrate. The amount, however, was so small that the 75 grams of the drug remaining after extracting the oil with petroleum spirit were exhausted with dilute alcohol, the alcohol evaporated, and the residue, after rendering alkaline, was shaken repeatedly with chloroform until that solvent contained all the bitter principle. On evaporating the chloroform a residue was obtained which all efforts, so far, have failed to get in a crystalline condition. It is intensely bitter, of a faintly alkaline reaction, gives precipitates with phosphomolybdic acid, Mayer's test, tannic acid, and gives off ammonia on heating with potassium hydrate. It is therefore quite certain that this bitter principle is an alkaloid, and we suggest for it the name of *Lappine.*

The other constituents were not determined, but they with the bitter principle will be further investigated.

We were induced to make this analysis from an account of the medicinal value of the so-called burdock seed in Dr. Squibb's "Ephemeris," vol. i, page 115.

PHILADELPHIA, Feb. 17, 1885.

Production of Sulphate of Quinine in Europe.—The note under this heading which was published on page 27 of the January number has been corrected, some time ago, in the "American Oil and Drug Reporter," as far as it relates to the production of the factory of Fried. Jobst, Stuttgart; and I now desire to add that this quinine factory, which for many years has been under my special direction, does not, as stated in the note referred to, produce 20 kilos daily, but considerably more—about three times the quantity reported, as may be discerned from the fact that at the European-American Quinine Convention of the past year the establishment of Fr. Jobst ranged among the four largest quinine factories of Europe. Furthermore, the note referred to requires a correction, since at present the relations upon this field are completely altered, the leader of the figures given on page 27, the Fabricca lombarda, having retired from the scene of activity.

O. HESSE.

SUBSTANCES CONTAINED IN SAFFRON.

By R. Kayser.

Bouillon, Vogel, Quadrat, Rochleder and Mayer, and Weiss have at various times worked at this subject, but the information at present available is unsatisfactory. The author has therefore carefully investigated a sample of saffron, *Crocus electus Gatinais.*

Essential Oil of Saffron.—This was obtained from saffron by steam distillation in a current of carbonic anhydride. It is an almost colorless mobile liquid, with an intense odor of saffron. When exposed to the air, it becomes oxidised and turns brown and syrupy. Analysis showed its composition to be $C_{10}H_{16}$, so that it belongs to the class of terpenes.

Crocin.—Saffron was first freed from fatty matters, etc., by ether and then extracted with water at the ordinary temperature. The aqueous solution was shaken up with bone-charcoal, which absorbed nearly all the coloring matter. The charcoal was filtered off, and the crocin extracted from it by washing with pure water. This solution was evaporated to dryness, and the residue treated with 90 per cent. alcohol. On evaporating the alcoholic solution, a yellowish-brown brittle mass is left, which yields a yellow powder. Crocin is easily soluble in water and dilute alcohol, less so in absolute alcohol, and almost insoluble in ether. Strong sulphuric acid dissolves it to a deep blue solution, which turns first violet, then cherry-red, and lastly brown. Nitric acid (sp. gr. 1·4) gives a similarly colored solution, but the color immediately changes to brown. Hydrochloric acid yields a yellow solution. Lead acetate, and lime- and baryta-water give no precipitate, but, on heating, they decompose crocin into crocetin and a sugar. Alkalis cause the same decomposition in the cold. Crocin is thus a glucoside, and analysis shows its composition to be $C_{44}H_{70}O_{28}$.

Crocetin is best obtained by the action of hydrochloric acid on crocin. It is precipitated in the form of yellow flocks, which when dried yield a red powder. It is almost insoluble in pure water, but is rendered soluble by the addition of a small quantity of an alkali. Acids reprecipitate it from such solutions in orange flocks. It is easily soluble in alcohol. An alcoholic solution gives bright red precipitates with lead acetate, and with lime- or baryta-water; the compounds so formed, however, are not definite, but vary in composition. Sulphuric and hydrochloric acids behave with it as with crocin. Its composition

is $C_{34}H_{46}O_9$. The decomposition appears to take place according to the equation $2C_{44}H_{70}O_{28} + 7H_2O = C_{34}H_{46}O_9 + 9C_6H_{12}O_6$.

Crocose.—The sugar mentioned above yields rhombic crystals. Its solution has a sweet taste and strong dextrorotatory action. Its reducing power for Fehling's solution is only half that of dextrose. The quantities of crocetin and crocose obtained by the decomposition agree very closely with those required by the above equation.

Picrocrocin.— Saffron-bitter.—This substance crystallizes out in the ether-extracting apparatus if the extraction be continued for a long time. It forms colorless prismatic needles, very sparingly soluble in ether. It dissolves easily in water and alcohol, less so in chloroform. It has a characteristic bitter taste, which is very persistent. It melts at 75° to a colorless liquid. Its formula is $C_{38}H_{66}O_{17}$. Lead acetate, lime-water and baryta-water give no precipitate in the cold, but decomposition takes place on warming, crocose and the terpene described above being formed. Picrocrocin is thus a glucoside like crocin, and the decomposition may be expressed by the equation—

$$C_{38}H_{66}O_{17} + H_2O = 3C_6H_{12}O_6 + 2C_{10}H_{16}.$$

—*Jour. Chem. Soc.*, 1885, p. 59; *Berichte*, 1884, pp. 2228–2234.

So-called Carbonate of Titanium.—In a paper read before the Detroit Academy of Medicine, and published in "Jour. Am. Med. Assoc.," November 29, 1884, Dr. A. B. Lyons communicates the analysis of a sample of this new pretended remedy, which consisted of

Ferrous sulphate (cryst.)	54·8
Ferric oxide (anhydrous)	40·5
Salts of calcium, potassium and sodium	2·2
Titanic acid and silica	1·0
Organic matter and loss	1·5
	100·0

The organic matter contained a vegetable alkaloid which proved to be sanguinarine. Practically, the powder consisted of a mixture of nearly equal parts of sub-carbonate of iron and sulphate of iron, partially exsiccated, with addition of an insignificant quantity of blood-root. (See also "Am. Jour. Phar.," 1884, p. 648.)

THE ESSENTIAL OIL INDUSTRY IN GRASSE.[1]

By F. A. Fluckiger.

The world-wide fame of Grasse depends upon the essential oils of plants which there grow wild or are cultivated. Among the former may be named:—(1) *Lavandula Spica*, Chaix (*L. latifolia*, Villars), the "aspic" of the French, which occurs plentifully in the country all around Grasse, and even quite close to the city. (2) *Lavandula vera*, DC. (*L. officinalis*, Chaix, *L. angustifolia*, Moench), which not only grows together with *L. latifolia*, but more frequently on high ground in the mountain region; generally *L. vera* is a much more widely spread plant throughout the Mediterranean region, and is also easily cultivated throughout Europe. Both these plants have stout woody stems, which are very enduring; those of thyme are still more vigorous. (3) *Thymus vulgaris*, L., a real ornament of the Mediterranean region, where it is found plentifully both in the Grasse district—not making its way so high up the mountains, but growing in the light thickets—and on unsheltered coast. (4) *Rosmarinus officinalis*, L., the erect but always bent stems of which, reaching a height of two metres, and often several centimetres thick, probably overtop most other labiates, or, at any rate, are not equalled in any other European species of this family. At Mentone and Nice it is difficult to say whether *Thymus vulgaris* or *Rosmarinus* grows most abundantly. At Grasse the latter manifestly loses ground, notwithstanding that it is by far more conspicuous than the lower lying thyme. Here and there *Cuscuta* (*Epithymum?*) selects the rosemary stalks for its home.

The oil of these four labiates constitute an important export industry of Grasse. The plants being vigorous, persistent bushes, they require no cultivation, as the tops, bearing leaves and flowers, taken for distillation, are always replaced, even though the collector does his work in a most unskilful manner. The large distilleries in Grasse conclude arrangements with the communities in the districts round about, by which they become entitled to the produce of large tracts of land. The work itself is done for the Grasse firms by the rural population, who set up their simple copper stills on the spot and only carry the distillate to the city. Many of these traveling stills (*alambics voyageants*) are indeed the property of the large houses in Grasse. Probably the work has long been carried on in this way. The Parisian druggist,

[1] Abstract from a paper in the *Archiv der Pharmacie*, xxii., 473.

Pierre Pomet, who was well informed in such objects, said in 1694, in his "Historie Générale des Drogues," concerning *Lavandula Spica*, "elle est si commune dans le Languedoc et en Provence . . . qu'elle ne coûte qu'à prendre," and he drew from this country the essential oils in question. That the oils are obtained in the manner indicated very cheaply is very probable, but it is a question whether a systematic cultivation and an economical manufacture would not induce greater progress. According to estimates for which the author is indebted to the kindness of M. Roure, proprietor of one of the largest manufactories, the following quantities of each oil are delivered in Grasse every year: from *Lavandula vera*, 80,000 to 100,000 kilograms; from *Thymus vulgaris*, 40,000; from *Lavandula Spica*, 20,000 to 25,000; from rosemary an equal quantity. The quantity sent out from Grasse probably covers the requirements of the whole world; at least the author only knows of rosemary that it is cultivated also in Dalmatia, which country sends about 20,000 kilos. of the essential oil into the market.

Oil of thyme furnished the first materials, in 1847 and 1853, for the investigation of thymol, but this substance is no longer prepared from it. The amount of thymol in the oil appears to vary considerably, and more exact information on this point is desirable.

Of the oils which, unlike those already mentioned, are regularly distilled in the laboratories of the Grasse manufactories, those of species of *Citrus* must be named, and especially oil of neroli. The flowers of the bigarade tree (*Citrus vulgaris*, Risso) are not submitted to distillation for the oil, of which they yield at most one part from one thousand parts, but for the production of the thousands of hectolitres of "eau de fleurs d'oranger," "aqua florum aurantii," and "aqua naphæ," upon which Grasse prides itself; the oil of neroli is a bye-product, though of course very costly. According to the author's informants, about 2,000 kilograms of this beautiful oil is prepared in Grasse yearly, but nominally much more is exported. When a proper price is paid a pure oil of neroli may be obtained; but the perfumers and druggists require it at reduced prices. In order, therefore, to acommodate them the producers add some "essence de petit grain," which, however, is no longer distilled from "petit grain," *i. e.*, the small unripe fruit of the bigarade tree, but from its leaves. No other species or form, however, of the genus *Citrus* is endowed with so fine an aroma in the leaves, as the bitter-fruited orange tree, the "bigaradier." The blos-

soms of the ordinary sweet-fruited orange, which are not used for distillation, yield only an oil of inferior value. In competition with the products of the bigaradier, the sweet orange which is cultivated in Grasse is disappearing. Neither the bergamot nor the lemon occur there.

At the time of the author's visit the enormous metal tanks and cemented cisterns for holding rose water in the factory of M. Roure were ready for the reception of the products of the coming season, which, like that of the neroli flowers, is at its height in the month of May, when thousands of kilograms of rose leaves are passed daily into the stills. The rose oil collected in small quantity during the distillation of the rose water is probably equally as fine as the oil of roses from the Balkans or from India; but notwithstanding it grows in nearly the same geographical latitude, the rose in Provence produces far more of the worthless solid constituent, dissolved in the liquid portion, which alone is odorous. The question arises whether a change in the strain of the roses so largely cultivated in Grasse might not lead to an improvement in respect to the oil. However, the rose water has for a century found a good sale, so that Grasse is not under the necessity to seek for further progress. The oil at present obtained in the manufacture, amounts to about one kilogram from each 12,000 kilograms of fresh rose leaves; to completely satisfy the requirements of customers, oil is obtained from the Balkans. The author thinks that the manufacture in Grasse affords a favorable opportunity to determine the chemical properties, hitherto completely unknown, of the oil to which the rose owes its perfume.

In perfumery "beurre d'iris" justly enjoys great popularity. It is distinguished above many other perfumes by an agreeable softness and great permanence. With the help of the most perfect methods of distillation, iris root yields scarcely one part per thousand of the so-called "orris-root camphor." The above named house in Grasse prepares four to ten kilograms yearly. Probably an equal quantity is distilled in London and in Leipzig. A specimen of orris butter presented by M. Roure to the author enabled him to make a comparison of it with preparations from the two other sources.[1] In the case of orris butter also we have to do with an oil, entirely uninvestigated as to its composition, occurring in minute quantity together with the odorless prin-

[1] See Flückiger's "Pharmacognosie," p. 314.

cipal constituent, in this case myristic acid. In Grasse "beurre d'iris" is valued at 1,500 to 1,800 francs the kilo. It is noteworthy that the local manufacturers draw their supplies of raw material from Florence and Verona, whilst there cannot be the remotest doubt that *Iris germanica* and other species of *Iris* flourish equally as well on the mountains and hills of Basse-Provence as in the fields of Tuscany or at Verona. In this case, however, also there is no necessity to give up the old custom, which is indeed carried so far that in no case is the *Iris germanica*, abundant in the district, made use of.

Besides the wholesale distillation of orange flowers and roses, some other aromatic plants are occasionally worked up when required, though not to any very great extent. But another source of considerable revenue is the manufacture of "pommades" and "extracts." In this extensive branch of industry the essential oil is utilized from flowers containing it only in very small quantity. Among these are (1) the bigarade orange flowers, and (2) roses. In the following the essential oil is present in so minute a quantity that it is scarcely practicable to obtain it by distillation.

(3). *Cassie.*—This is the name given by the French to the elegant yellow flower-heads of the *Acacia Farnesiana*, Willd., a small tree which first reached the Farnese gardens at Rome from the West Indies and Central America. The fine odor of the flowers brought about its introduction into Provence, which it appears did not take place, at least for industrial purposes, until 1825.[1] At present "cassie," is cultivated very carefully and on a large scale throughout the entire district between Canne and Grasse. The plantations are usually the property of the manufacturers, or other landed proprietors and are worked by lessees, the terms being the simple and primitive arrangement of sharing the proceeds with the proprietors. This system extends in this country to other perfumery plants, as well as to the olive.

(4). *Jasmin.*—The fields near Grasse are generally planted with *Jasminum officinale*, L., which was probably first brought to Italy from

[1] "Apportées en France vers l'année, 1825" (Guib. Hist. Dr. iii, 1869), 396. Ricord-Madiana, as well as Bonastre, attempted in 1830 and 1831 the chemical investigation of the flowers of the West Indian *Acacia Farnesiana*, though without any result worth mentioning (*Journ. Pharm.*, xvi, 571; xvii, 419). In the East Indies a gum exuding from the stem of the plant is collected. The root bark is said to have a very strong garlic-like odor; it therefore probably contains an allyl compound. (Flückiger, *Pharmakognosie*, 1879, p. 65.)

Asia Minor or India in the sixteenth century; but it is found advantageous to graft upon it the *Jasminum grandiflorum*, L., bearing larger flowers, having a more powerful odor; this also is an Indian species, which probably came to Europe before the time of Rheede, in whose 'Hortus Malabaricus' (v., tab. 52) it is figured. But the *Jasminum grandiflorum*, here known as "Jasmin d'Espagne," even in the beautiful Paradise of Provence, requires some shelter in winter, and this is effected by simply covering the small bushes with earth. Since only the flowers are required, the plants are allowed to grow scarcely half a metre high, and they are planted close to one another in regular rows. In the spring the young shoots are cut back. The flowering takes place in August. Professor Flückiger suggests that an enterprising cultivator might make experiments at Grasse with the *Jasminum Sambac*, Vahl, which in India is far more highly prized and appears to possess a perfume far more powerful than that of any other species of jasmine, as was pointed out two hundred years ago by Rumphius. A figure of *Jasminum Sambac* is given in the *Botanical Magazine*, vol. xliii. (1816) No. 1785.

(5). *The jonquille* (*Narcissus Jonquilla*, L.), probably of oriental origin, bears two to five extremely odorous yellow flowers, with a short funnel-shaped perianth and a corona four times as long. The name of the species (Italian, *giunchiglia*) is derived from the nearly cylindrical leaves, grooved on their upper side, recalling those of species of *Juncus*. When the author was in Grasse, in April, the flowering of the jonquil was already over.

(6). *Réséda* (*Reseda odorata*), cultivated throughout Central Europe as a favorite garden and pot plant; it is alleged to have been derived from Egypt.

(7). *Tubéreuse* (*Polianthes tuberosa*, L.) an Amaryllidaceous plant, belonging to the Agave division, and a native of Mexico. Its beautiful white flowers give its name to the genus (*polios*, white or grey); the single species has a short tuberculous thickened rhizone. The Polianthes was introduced in Europe during last century as an ornamental plant on account of its noble head of odorous flowers, which probably are nowhere else cultivated in such quantity as at Grasse. Already, between 1571 and 1577 it had attracted the attention of the Spanish physician Francisco Hernandez, who undertook the scientific exploration of Mexico at the cost of King Philip. In his "Nova Plantarum, Animalium et Mineralium Mexicanorum Historia" (Rome

1651, p. 27), the indefatigable physician gives a modest but unmistakable figure, with a corresponding description of the beautiful plant, under the name "Omizochitl, seu Flos osseus." He also mentions its use in making odorous wreaths. Upon this point the scanty notice which Clusius gives in 1601 of the "hyacinthus indicus tuberosa radice" in the 'Rariorum Plantarum Historia' is silent. Clusius' figure is not so faithful as the one previously mentioned. Since the time of Clusius the name tuberose has clung to the plant.

(8). *Violette.*—The *Viola odorata* is not grown in the open field, like the other perfumery plants, but in the olive groves, which here extend over hill and valley in special beauty. The Riviera can show far larger and wider spreading olive trees, but those in the neighborhood of Grasse are remarkable for their fresher and greener foliage. Besides this, the ground shaded by the trees is there richly overgrown with grass, so that the color of the landscape recalls the loveliness of the hills near Florence. With such surroundings, the violet plantations spread out here and there, both in the immediate neighborhood of Grasse and on higher slopes, present a charming appearance. Occasionally the *Sarothamnus* is associated with it also. At the time of the author's visit he saw at the factory a large sack of the last violets of the season, which had been delivered fresh by the collectors only an hour before. The flower was the ordinary *Viola odoruta*, neither darker nor brighter in color, nor possessing a stronger perfume. But he was told that "les dernières de la saison" had a decidedly weaker odor, and he heard also that the collectors were dissuaded from bringing any more.

A great part of the industry and trade of Grasse is dependent upon the foregoing eight plants and it does not suffer from fluctuations due to change of fashion like many other industries. Year after year the manufacturers supply to their customers the same favorite "pommades" and "extracts," and it is noteworthy that no perfumer from the large centres of fashion should direct his attention to other preparations of the kind. The explanation may be that the introduction of novelties into this domain requires an acquaintance with the vegetable kingdom which is scarcely possessed by the purchasers of the pommades and extracts of Grasse.

The "pommades" are prepared by two methods, "infusion" and "enfleurage." In the former the transfer of the odorous principles to fat is brought about by intimate contact and warming. The predilec-

tion of the human family for unguents may not be easy to explain, but probably it goes back to the highest antiquity. Pliny ascribes their discovery to the Persians, and Pliny, Dioscorides, and other old writers refer in great detail to these preparations. In the present day pharmacy seeks not so much to convey to fat the agreeable odor of flowers as the healing properties of particular plants.

Dioscorides gives quite a detailed introduction to the purification of the fat for the purpose, and the preparation of this basis of pommades in the best condition is still the first endeavor of the manufacturers in Grasse. The best pig's lard or beef suet is selected, a considerable portion being contributed by the populous towns of the Riviera, as well as Lombardy. The melting of the fat, its mechanical purification and washing, are conducted with exemplary care and cleanliness. The digestion of fat with benzoin has long been carried on in Grasse on the largest scale, furnishing an incontestable opportunity of demonstrating its effectiveness; and the fact that the stability of fat is essentially increased by the process admits of no doubt. Lard and beef tallow, either separate or mixed in the proportion of 2 : 1, are kept until required for use in tinned iron vats, in fine dry ventilated cellars. The "infusion" is effected in large jacketted boilers, in which the fat is warmed by steam heat, and the flowers are added. In the month of May over 10,000 kilograms of rose or bigarade flowers pass daily, for many days in succession, into the boilers of the factory of Roure-Bertrand fils alone, and this is only a part of the daily consumption in the factories in Grasse. The diligent stirring of the flowers in the fat-bath is carried on by female workers, the expression by means of hydraulic presses is done by men. After the clearing of the fat by deposition and straining, the finished pommade is at once weighed off in tin boxes or passes into the large subterranean storerooms, in which it will remain very good until at least the next season.

Notwithstanding the exemplary pains which are spent upon this "infusion à chaud," the fat still remains fat, gradually but inevitably undergoing change and becoming rancid. The question suggests itself whether the fat might not be replaced by the unalterable paraffin which has so successfully competed with fat in pharmacy. It might be thought that such a preparation as the unguentum paraffini of the German Pharmacopœia would be particularly suited to acquire the most delicate perfume and preserve it faithfully. But Professor Flückiger was assured by M. Roure that this is by no means the case.

Why this should be, appears inexplicable, but the inapplicability of paraffin is so decided that even the addition of it to fat in the preparation of pommades by the foregoing method is said to have proved injurious. Professor Flückiger considers this point worthy of further investigation, and remarks that results obtained by himself, some experiments upon a small scale were hardly confirmatory of the statements.

In the incorporation of the most delicate perfumes with fat the above method of that of "infusion à chaud" is replaced by "enfleurage." For this purpose, light square wooden frames, about 18 inches each way, in which a plate of glass can be placed, are used. All the frames and glass plates are of the same size; when piled up one upon another, therefore, they form small, tolerably well-closed compartments. Upon each glass is spread a weighed quantity of fat in a thin layer, and this is strewn thickly with flowers. Sometimes, however, the one side of the glass plate is covered with flowers only, and the layer of fat is confined to the other glass wall of each compartment, so that contact of the flowers with the fat is avoided. When a perfumed oil is desired, use may be made of cloths saturated with oil for the enfleurage. The fat is kept shut up in these glass compartments for a longer or shorter time according to the nature of the flowers and the qualities of the article required and the flowers have to be repeatedly removed, even as often as every day. Many kinds of pommades require some weeks of enfleurage.

A portion of the pommades obtained by these methods is eventually used in the preparation of the odorous "extraits." This is the name by which the extracts obtained by treatment of these preparations (and other odorous substances) with strong alcohol are known in French perfumery. For this purpose the pommades are placed in copper drums, where by means of powerful stirrers a most intimate mixing of the alcohol with the fat is continued for hours. The alcohol takes up scarcely any of the fat, but the greater part of the odorous substances. By this method the odorous constituents, whether essential oils or other compounds is not known, which cannot be satisfactorily obtained by distillation, are transferred in a pure and unaltered form to the alcohol. The fat takes up little else from the respective flowers, and probably retains a small quantity of matter unconnected with the perfume which it gives up very pure to the alcohol. After this has been removed, the fat is placed in a still and the alcohol recovered for further use; the

fat, on the contrary, is not again employed in any part of the manufacture. It would appear that decomposition commences during the long kneading with alcohol in contact with air, although the drums in which the "extraits" are made are kept closed. But there can be no doubt the fat could be rendered serviceable again; at present it passes from the perfume manufacturer to the soap boiler.

Similar "extraits" may be prepared from plants, when no coloring matter interferes, by simple digestion with alcohol.—*Pharm. Jour. and Trans.* Dec. 13, 1884, p. 468.

CRYSTALLIZED ARBUTIN AND ARBUTOSE.[1]

By J. Dalmon

The remarkable memoir published by Lewin[2] upon the transformation of arbutin, the active principle of the bearberry (*Arctostaphylos Uva-Ursi*), into hydroquinon in the animal economy has directed attention to this compound, which is thought to be destined to take an important position in the materia medica among the antiseptic agents. The author has therefore been induced to take up the chemical study of arbutin, with a view to obtaining it in a pure crystalline condition and of devising a rapid and economical process for its preparation.

Arbutin, in a state of absolute purity, occurs in handsome white shining crystals, most frequently arranged in rays round a central mamelon. It has a bitter taste which develops upon the palate and presents some analogy with that of quassin.

Arbutin is a glucoside. Kawalier, who appears to have been the first to isolate it, attributed to it the formula $C_{32}H_{44}O_{19}$. Strecker afterwards represented it by $C_{12}H_{16}O_7$. Subsequent analyses by Hlasiwetz and Habermann led, however, to the formula $C_{25}H_{34}O_{14}$. It is very soluble in water, slightly soluble in cold alcohol, and scarcely soluble in ether. Under the influence of weak acids arbutin is decomposed into glucose and hydroquinon; at the same time, there is produced, according to the author, a considerable proportion of the methylic ether of hydroquinon. Further investigation, however, is required to clear up the exact nature of the decomposition. According to Lewin, an aqueous solution of arbutin does not reduce an alkaline cupric solu-

[1] "Bulletin Commercial," (L'Union Pharmaceutique,) xii, 440.

[2] "Pharmaceutical Journal," [3]. xiv, 490.

tion, this reaction only occurring when some decomposition has taken place; neither does yeast set up fermentation with pure arbutin.

Arbutin is colored blue by dilute solution of perchloride of iron. In testing for this glucoside, the substance to be examined is moistened with strong nitric acid, then boiled with a mixture of eight volumes of alcohol to one of sulphuric acid; finally, water and an excess of potash are added, when the liquid takes the violet tint of the potash salt and of dinitroquinon.

The preparation of arbutin, although very simple in theory, presents considerable difficulty in practice. The bearberry is especially rich in tannin (averaging 35 per cent.), and in addition contains gallic acid, urson, a resinous matter, gum, chlorophyll, pectin, besides arbutin, to which last it appears to owe the greater part of its therapeutic properties. All these principles, with the exceptien of urson, are soluble in boiling water.

The process given by the author for the preparation of arbutin is to treat by successive decoctions the drug reduced to a coarse powder, then to combine the products and precipitate the tannin and extractive matters with subacetate of lead. The decolorized liquid is treated with sulphydric acid and evaporated rapidly. The arbutin crystallizes upon cooling in the concentrated liquor; but in consequence of the decomposition of a certain quantity of arbutin during the operation a sticky crystalline mass is obtained which dries only imperfectly. This complex product is called "arbutose" by the author, who says it is tolerably uniform in composition, the proportions being about 55 per cent. of crystalline arbutin, 35 per cent. of glucose and 10 per cent. of water. In order to obtain the crystalline arbutin this arbutose is dried in the air as far as possible, treated with charcoal and then with successive quantities of alcohol and distilled water.

But the author is of opinion that, with the exception of solutions intended for hypodermic injection, for which only the crystallized arbutin should be used, arbutose may be used in all pharmaceutical preparations. In order to determine its strength it is only necessary to estimate the glucose by means of cupropotassic solution, and deduct this and the water, the remainder representing pure arbutin. Arbutin may also be administered under the form of an elixir or in pills.

Arbutin is non-poisonous, and may be given in doses of from 50 centigrams to 2 grams twice daily. Under the influence of this glucoside the urine will after the second day frequently show a green color,

which is due to the presence of hydroquinon. The author has observed that on his own person large doses have a tendency to produce an eruption of the skin, a fact of which it would be necessary to take cognizance when administering arbutin to patients of herpetic temperament.—*Phar. Jour. and Trans.*, Feb. 14, 1885, p. 659.

NOTE ON THE PURITY OF COMMERCIAL KAMALA.

By P. W. Squire, F.C.S., and R. A. Cripps.

Having had occasion, a short time ago, to examine a sample of kamala before buying, we were somewhat surprised to find a very large proportion of ash, which led us to obtain a number of samples from good houses, with a view of determining to what extent this article is contaminated with earthy impurities. The results were so surprising that we have thought them sufficiently important to embody in this short note.

In the "Pharmaceutical Journal," [3], vol. i, p. 708, it is stated that "kamala always contains from 6 to 10 per cent. of sand, and 1 to 2 per cent. of sesquioxide of iron," while in a paper by Mr. T. B. Groves, read before the British Pharmaceutical Conference in 1872, the amount of ash is said to be less than 4 per cent. Flückiger and Hanbury give only 1·37 per cent., and the United States Pharmacopœia recognizes an article containing not more than 8 per cent.

As will be seen by the following table, our results vary from 6·02 to 61·5 per cent.; only one sample can fairly be supposed to be genuine. The ash in most cases consisted of a reddish sand, but its composition was not determined, while the best sample left a greyish ash, about one-half of which was insoluble in hydrochloric acid.

Sample.	Amount of ash.	Color of ash.
A	25 per cent.	Reddish.
B	13·5 "	Greyish.
C	61·5 "	Reddish.
D	24·0 "	"
E	59·6 "	"
F	40·3 "	"
G	46·2 "	"
H	47·3 "	"
I	30·3 "	"
J	6·02 "	Greyish.
K	26·7 "	Reddish.
L	47·6 "	"

—*Phar. Jour. and Trans.*, Feb. 14, 1885, p. 654.

THE DETECTION OF ALOES IN PHARMACEUTICAL PREPARATIONS.[1]

By R. A. Cripps and T. S. Dymond.

Among the difficult problems occasionally met with by a chemist is that of detecting aloes in compound mixtures. This involves, by all ordinary methods, a considerable amount of trouble in separating the various substances by means of solvents, and entails the use of a large quantity of substance, which in the case of pills, etc., cannot always be spared; the results, even then, are often unsatisfactory. Perhaps the test proposed by Bornträger (*Zeitschrift für anal. Chem.*, xix, 165), is the best of those hitherto published. It consists in extracting the substance with alcohol, filtering, shaking the filtrate with benzol, removing the benzol layer and agitating it with ammonia; on standing the aqueous liquid should assume a pink color in presence of aloes. This test was applied to a number of different kinds of aloes, for most of which our thanks are due to Mr. Holmes, but the results were not very satisfactory, some of the specimens requiring twenty-four hours to develop the pink color, only four giving it at all distinctly at once. Mr. R. H. Groves has pointed out (*Pharm. Journ.* [3], xi, 1045) that certain precautions are necessary to render the test trustworthy, and that the color reaction is not due to the aloin, and it has also been shown by Lenz (*Zeitschrift für anal. Chem.*, xxi, 220) that any substance containing chrysophanic acid also gives this coloration, and it is, therefore, useless for distinguishing aloes from rhubarb, etc.

The following test has been proposed by Klunge (*Archiv der Pharm.*, 1883, 363). To an aqueous solution of the suspected substance, diluted with water till nearly colorless, a drop of copper sulphate solution is added. An intense yellow coloration, which on warming with a little chloride of sodium changes to a deep red or violet, indicates the presence of aloes. This test is also unsatisfactory, for neither do all the varieties of aloes give this deep red color, nor is the yellow color, though distinctive of aloes, seen in solutions containing already a yellow coloring matter such as saffron.

In view of this unsatisfactory state of the detection of aloes, we now propose a test depending, first, on the reaction given by aloes with sulphuric acid and nitric acid; secondly, on the reaction of the resulting acid mixture with water; and thirdly, on the reaction of this diluted

[1] Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, February 4, 1885.

acid mixture with ammonia. The application of these reactions in the manner we prescribe constitutes, we think, a new and useful test for aloes. This test can be applied directly to the substance suspected, if a solid; but liquids should first be evaporated so as to leave a thin film of extract on the sides of the dish, to which the test is then applied.

The following is the method adopted: Place 1 grain of the substance in a glass mortar standing on white paper; add now 16 drops of strong sulphuric acid and triturate till the whole is dissolved; then add 4 drops of nitric acid, sp. gr. 1·42, and lastly, 1 ounce of distilled water. If aloes be present a color varying from deep orange to crimson will be produced, according to the kind of aloes employed. To confirm, add ammonia, when the color is deepened, usually to a deep claret. This test was first applied to the same series of specimens as Bornträger's and Klunge's tests were applied to, and, without exception, was found to give good results; in fact, not only was the presence of aloes detected, but a fair indication of the kind of aloes was given, the varieties of Barbadoes, true Socotrine and Natal producing a crimson, while hepatic and Cape only a deep orange-red. We also used for comparison the test with sulphuric acid and vapor of nitric acid, which produces with certain aloes a play of colors passing through green, blue and violet to crimson; our results are shown in the following table:

Variety of Aloes.	Bornträger's Test.	Klunge's Test.	H_2SO_4 and vapor of HNO_3.	Cripps and Dymond's Test.	Cripps and Dymond's Test with Ammonia.
Barbadoes	Pale rose color.	Deep red.	Faint blue color.	Crimson.	Deep claret.
Natal	Very faint pink.	Faint red.	Deep blue color.	Deep crimson.	Intense brownish-red.
Curaçoa	Fine rose color.	Deep red.	Faint blue color.	Crimson.	Intense claret.
Hepatic	Faint color after 24 hours.	Nil.	Nil.	Orange-red.	Claret.
Hepatic (Indian).	Faint color after 24 hours.	Nil.	Nil.	Orange-red.	Pale claret.
Cape	Faint color after 24 hours.	Nil.	Nil.	Orange-red.	Pale claret.
Socotrine (true)	Pale rose color.	Faint red.	Very faint blue color.	Pale crimson.	Deep claret.
Socotrine (commercial), three samples	Pale rose color after 24 hours.	Nil.	Nil.	Orange-red.	Claret.
Socotrine (Mocha or Zanzibar)	Pale rose color.	Red.	Faint blue color.	Crimson.	Deep claret.
Aloes juice (Natal)	Pale brownish pink.	.....	.....	Crimson.	Intense brownish-red.

Having thus proved tnat the test is applicable to any variety of aloes, it remained to be determined whether the presence of aloes in complex mixtures could be proved, and also whether any other substance will give the same reaction. With this object we have carefully examined a very large number of preparations, first those which were known to contain aloes, then other extracts, etc.

The following table shows the results:

Name of preparation.	Cripps and Dymond's test.	Cripps and Dymond's test with AmHO.
Barbaloin	Purplish-red	Red.
Jafferabad aloin	Purplish-red	Red.
Ext. aloes, barb	Crimson	Red.
Ext. aloes, socot	Crimson	Red.
Dec. aloes comp	Orange-red	Red.
Vin. aloes	Orange-red	Red.
Tinct. aloes	Orange-red	Red.
Pil. aloes, barb	Crimson	Red.
Pil. aloes, socot. (1)	Pale crimson	Red.
Pil. aloes, socot. (2)	Orange-red	Red.
Pil. aloes et assaf. (1)	Pale crimson	Red.
Pil. aloes et assaf. (2)	Orange-red	Red.
Pil. aloes et ferri	Crimson	Red.
Pil. aloes et myrrh	Orange	Red.
Pil. coloc. comp	Crimson	Red.
Pil. coloc. c. hyos	Orange-red	Red.
Pil. cambog. comp	Orange-red	Red.
Pil. rhei comp	Crimson	Red.
Pil. ipecac. c. scillâ	Pale yellow	Yellow.
Pil. saponis comp	Yellow	Yellow.
Pulv. sennæ	Orange-red	Red.
Ext. aconiti	Yellow	Yellow.
Ext. bellad	Yellow	Yellow.
Ext. colchici	Pale yellow	Pale orange.
Ext. coloc. simp	Pale yellow	Yellow.
Ext. coloc. comp	Orange-red	Red.
Ext. conii	Brownish-yellow	Yellow.
Ext. frangulæ	Orange-red	Red.
Ext. gentianæ	Pale yellow	Yellow.
Ext. jalapæ	Pale yellow	Yellow.
Ext. lupuli	Orange-yellow	Yellow.
Ext. nucis vom	Orange	Yellow.
Ext. opii	Orange	Orange.
Ext. quassiæ	Deep yellow	Yellow.
Ext. rhei	Orange-red	Red.
Ext. taraxaci	Pale yellow	Yellow.
Fel bovin. purif	Yellow	Yellow.
Rad. rhei	Orange-red	Red.
Salicin	Pale yellow	Nearly colorless.
Croci stig	Yellowish	Yellow.
Acid. chrysophanic	Deep orange	Red.
Resin. scammon	Pale yellow	Yellow.

From the above table it will be seen that though the presence of aloes never fails to make itself manifest, rhubarb and substances containing chrysophanic acid behave in a similar way; but a nearly col-

orless aqueous solution of aloes does not become pink when ammonia is added, as is the case with solutions of substances containing chrysophanic acid, and in this way aloes may be distinguished. To this rule senna is the only exception.

The probable explanation of the color reaction we have described is that chrysammic acid is produced by the oxidation of the aloin, a reaction which Tilden has shown takes place when aloes is treated for some time with nitric acid alone ("Year-Book of Pharmacy," 1870, 1872, 1875, 1877). The red solution of chrysammic acid is changed by the action of ammonia to deep claret chrysamide. This reaction does not explain the color produced with Natal aloes, which, according to Tilden, yields no chrysammic acid.—*Phar. Jour. and Trans.*, Feb. 7, 1885, p. 633.

GLEANINGS IN MATERIA MEDICA.

By the Editor.

Chemistry of Daphnetin.—H. Stünkel has shown, in 1879, that this compound is most likely a dioxycoumarin. W. Will and O. Jung have now further investigated this decomposition product of daphnin. About 20 kilos of extract of mezereon are necessary for preparing about 30 grams of daphnetin, from which a number of derivatives were prepared, showing that daphnetin has the same relation to pyrogallic acid as coumarin has to phenol, umbelliferon to resorcin, and most likely æsculetin to phloroglucin.—*Berichte D. Chem. Ges.*, 1884, p. 1081–1091.

Buxus sempervirens, Lin.—G. A. Barbaglia has separated from the leaves and twigs of the box a fourth alkaloid, which he names *parabuxinidine*. It crystallizes in thin colorless prisms, is insoluble in water, soluble in ether, freely soluble in alcohol, colors turmeric paper deep red, and gives with an alcoholic solution of oxalic acid a heavy white precipitate consisting of minute colorless rhombic plates.—*Ber. d. Chem. Ges.*, 1884, 2655.

Chaulmoogra Seed.—Dr. Jos. Moeller has examined the seeds of three species of Bixaceæ, with the following results:

1. Gynocardia odorata, *R. Brown*. The seeds are about 3 Cm. long and 1·5 Cm. in their greatest breadth, elongated ovate, somewhat flattened and irregularly angular; the hilum is at the pointed end. The surface is dull yellowish gray, and somewhat scurfy to the touch from an adhering thin layer of pulp. The seeds weigh about 3 Gm., of

which the integument is 0·8 Gm. The latter consists of an outer and inner layer of stone cells placed parallel to the surface, and between these two layers of two or three rows of stone cells, the long axes of which are nearly at right angles with the former cells. The inner surface of the sclerenchymatous tissue is covered with a delicate and partially broken layer of elongated parenchyma cells. The endosperm consists of tolerably thick-walled cells filled with solid colorless fat and large yellow spherical or irregularly rounded bodies, insoluble in alcohol and benzol; starch and tannin are absent; calcium oxalate crystals were not observed.

2. Hydnocarpus anthelmintica, *Pierre.* (See "Amer. Jour. Phar.," 1884, p. 526.) The seeds are about 18·14 Mm. broad, little longer, resemble a small bulb in shape, weigh barely 2 Gm. (the albumen 0·6 Gm.), are brownish black, rough, hard, and have a large rayed hilum. The integument is 1·5 Mm., thick, and has a lighter colored inner layer, 0·15 Mm. thick, and consisting of tangentially arranged, and relatively little thickened, stone cells; the cells of the middle layer are placed at right angles to the surface; those of the exterior layer are tangentially arranged, and those of the adhering pulp are rather small and frequently interspersed with groups of stone cells. The cells of the endosperm are smaller than in Gynocardia, and do not contain the yellow bodies seen in the latter, but besides oil contain numerous colorless roundish albuminoid granules.

3. Hydnocarpus inebrians, *Vahl.* Some of the seeds resemble the preceding, but are flatter, whilst others are pointedly elliptical in shape. They attain a length of 3 Cm., a breadth of 15 Mm. and a thickness of 10 or 12 Mm. The hilum is prominent and warty, the surface longitudinally wrinkled. The weight of the smaller seeds is about 1 Gm. (the integument one-third), of the larger seeds, about 2 Gm. The integument is 0·2 Mm. thick, and consists of three layers of stone cells, arranged as in the two preceding seeds, but the middle layer has only one, or at most two, rows of cells. The adhering pulp resembles that of H. anthelmintica. The endosperm is covered with a layer of thin-walled brownish red cells, but is itself colorless, and teems with fat and protein globules.—*Phar. Jour. and Trans.*, October 25, 1884, p. 321.

Euphorbia pilulifera, Linné.—This plant, which has long been in use in tropical countries for various complaints, and has lately been introduced here as a remedy in asthma, was analyzed by Charles G. Levison, Ph. G., San Francisco, Cal., with the following results:

	Per cent.	
Moisture	25·00	
Amount soluble in ether, ·725		15·00
" " alcohol, ·820		5·75
" " water		16·60
Insoluble residue, consisting of cellulose, lignin and siliceous earth, etc		62·65
		100·00
Ash	20·00	
Amount soluble in water, including potassium, sodium and magnesium, phosphates, sulphates, chlorides and carbonates		7·50
Amount soluble in diluted HCl, including calcium phosphates		3·50
Insoluble residue, consisting principally of silica and sand		9·00
		20·00
Amount extracted by ether, ·725	15·00	
Resin soluble in chloroform, CS_2, glacial acetic acid: glucoside		2·50
Wax, non-volatile, soluble in CS_2, chloroform, benzin and boiling 90 per cent. alcohol, and insoluble in cold alcohol		6·00
Chlorophyll		·25
Insoluble residue		·75
Ash of extractive		·50
Volatile matter driven off by heat		5·00
Tannin		Traces
		15·00
Amount extracted by alcohol	5·75	
Resin, glucoside, soluble in 90 per cent. alcohol, and insoluble in chloroform, ether and petroleum benzin		3·00
Resin, glucoside, soluble in 75 per cent. alcohol; insolubilities, ditto, as above		2·00
Resin, glucoside, soluble in 50 per cent. alcohol; insolubilities, ditto		·50
Ash of extractive		·25
		5·75
Amount extracted by water	16·60	
Starch colored blue by iodine and reducing Fehling's solution		5·30
Albumen soluble in acetic and phosphoric acids, and insoluble in nitric acid and alcohol, and coagulated by heat of 154°F		2·50
Pectin coagulated by alcohol		1·30
Gum insoluble in alcohol and soluble in water		1·70
Protein substance similar to albumen and not coagulated by heat		5·80
		16·60

—*Therap. Gazette*, Dec. 1884, p. 551.

Betaine in Cotton Seed.—In the mother-liquor, from which melitose had been separated, H. Ritthaussen and F. Weger found betaine, but have not yet ascertained in what form the alkaloid occurs in cotton seed.—*Jour. f. prak. Chem.*, xxx, pp. 32–37.

Betaine was discovered by Scheibler (1866) in the juice of the sugar beet, and was shown by Husemann (1875) to be identical with *lycine*, an alkaloid isolated from Lycium vulgare, *Dunal*, by Husemann and Marmé (1863). The same alkaloid is also obtained by the careful oxidation of *neurine*, an alkaloid obtainable from bile, brain and yelk of egg.

NOTE ON AN IMPURITY IN ETHER.

By C. J. H. Warden, M.D.,

Chemical Examiner to the Government of Bengal.

While in India last year, I accidentally discovered that all the samples of ether in my laboratory, when agitated with an aqueous solution of potassic iodide, liberated iodine, and communicated a yellow, or dark reddish color to the solution, the ether remaining colorless.

On agitating the ether first with a strong aqueous solution of potassic hydrate, or solid caustic potash, the caustic potash solution was colored yellow and the solid hydrate incrusted with a dark reddish-yellow deposit, and the ether thus purified no longer possessed the power of liberating iodine from iodide of potassium.

The samples of ether tested had all been received from well-known English druggists, and the bottles were labelled "ether pur. B.P." Since I have been in Europe I have only had an opportunity of examining one specimen and this also liberated iodine. On examination, however, it will probably be ascertained that most of the ether in the market responds to the test. I have not been able to investigate the cause of the reaction; it is very possibly due to the presence of aldehyde in the ether, and this view receives support from the action of the ether on caustic potash, already described, the yellow coloration being caused by the formation of aldehyde resin.

As ether is now extensively employed as an anæsthetic, and as aldehyde (assuming its presence) is not inert, its presence, or that of any other impurity, in the drug intended for inhalation must be considered objectionable. Aldehyde is described[1] as possessing a peculiar ethereal,

[1] Roscoe's "Organic Chemistry."

suffocating odor, and its vapor when inhaled in large quantity produces a cramp, which for a few seconds takes away the power of respiration (Liebig). The question suggests itself, may not the peculiar suffocating sensation often experienced during ether inhalation be caused by the presence of this compound?

The test I have described may be applied in two ways; two or three drachms of the ether are poured into a test tube, and about a drachm of a freshly prepared solution of iodide of potassium in water added, the tube corked, and the contents well agitated. If the ether be pure, on looking down the tube, while standing on a white surface, no yellow coloration of the aqueous stratum will be apparent. The other plan of applying the test is to add a few drops of starch mucilage to the ether and iodide of potassium solution and then to agitate; if iodine be liberated, it is recognized by the blueing of the starch.—*Phar. Jour. and Trans.*, Jan. 3, 1885, p. 521.

APPARATUS FOR CONTINUOUS PERCOLATION WITH BOILING FLUIDS.

By W. Watson Will.

In the issue of the "Pharmaceutical Journal" of October 11th, there is a description of an apparatus for continuous percolation, by Dr. Thresh, which is evidently an improvement upon the apparatus originally used by Tollens for the same purpose, the difference between the two apparatus consisting in the arrangement of the percolating tube; otherwise in principle they are the same.

In examining Dr. Thresh's apparatus I came to the conclusion that unless such an apparatus were employed in the hands of a skillful operator there is a considerable liability that the fine tube, with curved apex, would be broken in packing the substance for exhaustion; also that to make a punted and perforated tube such as he describes requires a considerable amount of skill. Otherwise it has the advantage over Tollen's apparatus, that through the centre of the substance there would pass a constant current of the vapor of the solvent by means of the fine tube, by which means the substance under examination is quickly heated throughout the mass.

I have used for some considerable time an apparatus much similar, but simpler in its construction, for the estimation of cinchona barks, scammony, etc. It consists of the following parts:

1. An ordinary flask, with a long narrow neck, and fitted with a perforated sound cork, or india-rubber stopper.

2. A half-ounce glass syringe, having its lower end stopped by a small plug of cotton wool; the upper end is closed by a perforated cork, through which passes the pointed end of the condensing tube, thus fixing the two tubes firmly together.

3. A long glass tube pointed at one end and having a small hole made near the pointed end to admit of the inflow of the vapor to be condensed.

4. Another, but wider glass tube, drawn out at one end, so as to admit of a perforated cork, through which passes the upper limb of the condensing tube. Near the lower end of this tube a small hole is made, into which is fixed a narrow glass tube, to which is attached a piece of india-rubber tubing, and if necessary closed by a clamp.

The working of the apparatus is very simple. Having placed the substance to be exhausted in the tube 2, the condensing tube is now firmly fixed into position and the liquid used for exhausting is poured down the tube. A current of cold water is now allowed to flow into tube 4, this being regulated by means of the clamp. Heat is now applied to the flask, when the vapor passes up and enters tube 3, where it condenses in the upper limb and flows back into the percolator.—*Phar. Jour. and Trans.*, Nov. 8, 1884, p. 363.

At the evening meeting, held November 5, Mr. Waite showed an extractor for continuous percolation, on the same principle as Dr. Thresh's, but more simple in construction. The apparatus consisted essentially of a single tube, of suitable calibre, drawn out at one end to a point, and fitted into the neck of a wide-bottomed flask, so that the point reached within a short distance of the bottom of the flask. At the side of this tube was a hole through which the vapor from the boiling liquid in the flask rose to a condenser, so that the condensed solvent fell upon the substance to be exhausted placed in the lower part of the tube and after percolating through it fell into the flask, where it was again vaporized and passed back as a vapor through the aperture above the mark. Mr. Waite said he had found the apparatus answer very satisfactorily.

ANÆSTHESIA BY CHLORAL.—M. Bouchut gives chloral in doses of from two to three grams, according to the age of the patient, and in a single dose, and asserts that it is a perfect anæsthetic. without any disagreeable result; and that he has administered it in this way in a large number of cases.—*New Eng. Med. Monthly.*

PRACTICAL NOTES.

BY THE EDITOR.

Linimentum Ammoniæ.—Mr. F. H. Alcock states that sesame oil makes a more satisfactory preparation than olive oil, or a number of other oils experimented with; even after standing three months there is no sign of separation, and the liniment presents a beautiful creamy consistence and color, but slightly altered during the time stated.—*Phar. Jour. and Trans.*, Oct. 11, 1884, p. 282.

Uses of Paraffin Oil.—Leon Crismer gives an interesting account of the uses to which paraffin oil may be put as a solvent and reagent.

Test for Water in Ether, etc.—Liquid paraffin dissolves in all proportions in anhydrous chloroform or ether, yielding clear solutions; but in the presence of water or of diluted alcohol the solutions are turbid. Liquid paraffin dissolves sparingly in absolute alcohol; such a solution at once becomes turbid on the addition of weaker alcohol. Methyl alcohol has a very similar behavior with paraffin oil. The presence of water in the liquids named may thus be readily ascertained.

Solvent Properties.—Liquid paraffin is a good solvent for amyl alcohol, crude fusel oil, chlorine, bromine, iodine and the phosphorus and alkyl compounds of the halogens. White phosphorus kept under paraffin oil unites readily and without danger of explosion with bromine dropped into the liquid, the mixture being kept cool; the phosphorus tri-bromide dissolved in the liquid paraffin, is decomposed on dropping in water, *hydrobromic acid* being given off, and may be completely dehydrated by passing the gas over phosphoric anhydride.

Hydriodic acid may be prepared in a similar manner. The iodine is added in small quantities to the phosphorus kept under liquid paraffin; water is added, and the mixture is finally heated in a sand bath.

Ethyl iodide is expeditiously prepared using liquid paraffin as a solvent for the phosphorus triodide, adding the alcohol gradually, returning the ether by means of a reversed cooler to the mixture and finally distilling. 13 Gm. phosphorus, 160 iodine and 60 absolute alcohol yielded 190 grams colorless ethyl iodide, which after treatment with a little iodine, sodium and finally with calcium chloride, furnished 182 Gm. ethyl iodide, sp. gr. 1·944 at 15°C., and boiling at 72·5°C.

Methyl iodide was prepared in the same way; the yield was 90 per cent.—*Berichte D. Chem. Ges.*, 1884, 649–652.

Excretion of Kairine.—Petri and Lehmann ascertained that kairine or hydrochlorate of oxyquinolinethyl hydride is found in the urine as an ethersulpho acid which is not destroyed during the ammoniacal fermentation of the urine, but is slowly decomposed by long-continued boiling with hydrochloric acid. Its solution slightly acidulated with acetic acid acquires with a solution of chlorinated lime a beautiful fuchsin red color, which begins to fade after about 30 minutes.—*Centralbl. Med. Wiss.*, 1884, p. 305.

Specific Gravity of Sulphuric Acid.—D. Mendelejew shows that the specific gravity of sulphuric acid (monohydrate) at 15°C. compared with water of 4°C. and calculated for the vacuum, is 1·8371, or very near this figure; his own determinations agree with those of Marignac, F. Kohlrausch and others, while Lunge's result, 1·8384, is too high.—*Ber. d. Ch. Ges.*, 1884, pp. 2536–2541.

Gallisin (see "Am. Jour. Phar.," 1885, p. 42) has been found by C. Schmitt and Jos. Rosenhek in commercial starch-sugars varying in quantity between 6·82 and 22·49 per cent., the water present amounting to from 14·11 to 21·59 per cent. By contact with pancreas gallisin is converted into a fermentable sugar yielding ethyl-alcohol; but the complete conversion has not yet been attained. The action of chlorosulphonic acid, of bromine, and of dry distillation with lime, has also been studied; the latter process yielded acetic acid, acetone and metacetone.—*Ber. d. Chem. Ges.*, 1884, pp. 2456–2467.

ACTION OF THE DIFFERENT ALKALOIDS OF ACONITE ON THE HEART.—Dr. A. Torsellini has recently made a series of experiments on the heart of the frog and the toad with the following results:

1. Nitrate of aconitine caused, in the exsected heart a slight, in the removed heart strong diminution of the cardiac beat; and in the latter also a very slight and transitory lessening of the systolic elevation. In neither was the rhythm irregular.

2. Nitrate of napelline causes irregularity of the rhythm in each, lessens the systolic elevation, and causes no slowing of the heart-beats in the exsected heart, but an increased contraction of the unremoved heart.

3. Nitrate of lycoctonine slightly increases the beats of the exsected heart, increases the systolic elevation in both, and does not change the regularity of the heart's action in the least; on the contrary, it antagonizes the irregularity caused by napelline.

4. Aconitic acid acts on the heart in a decidedly paralyzing manner.

From these results it is seen that the different alkaloids of aconite not only act differently, but that some antagonize others, as regards the effects on the heart.—*Centralbl. für die gesammte Therap.*, October, 1884; *Medical News.*

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, February 17, 1885.

The meeting was called to order by the registrar, and upon motion of Mr. A. Blair, Mr. Robbins was called to the chair.

The minutes of the last Pharmaceutical meeting were read and no corrections being called for they were approved.

Prof. Maisch presented from the British Pharmaceutical Conference a copy of the Year Book of Pharmacy for 1884.

Mr. Jos. W. England, Ph. G., of the class 1883, read a paper upon *tincture of ferric chloride* in which he reviewed the formulæ of the Pharmacopœia from 1840 to the present one, as well as of some recent propositions made in the pharmaceutical journals.

Prof. Maisch wished to know how long it would require to prepare, say a quart of the solution, by the formula proposed. In reply Mr. England stated, with inferior opportunities it required about an hour, and that under more favorable circumstances he thought it possible to shorten the process considerably. The paper was accompanied by samples of the various grades of solution and tincture.

Mr. Gustavus Pile stated that in order to overcome any trouble that might arise from accidental spilling or from the use of acid of insufficient strength, he had prepared a specific gravity table showing the amount of ferrous chloride in the solution and giving the requisite weight of hydrochloric acid to be added in the subsequent operation. In this way a carboy of acid may be worked up at a time, adding the iron till saturation is effected, making no account of the actual weights of the materials used. After the action has ceased, the liquid is filtered and the specific gravity taken; by comparing this with the table, the weight of acid to be added to each pint is at once ascertained, and the operation proceded with in the usual manner.

On motion the paper was referred to the publication committee (see page 113.)

Prof. Trimble read a paper upon an *alkaloid in the fruit of Burdock.* The experiments were made in the laboratory of the College by himself and Mr. Macfarland, of the present junior class. On motion the paper was referred to the committee on publication (see page 127.).

Mr. E. T. Ellis exhibited and presented to the cabinet a sample of *Coxe's Hive Syrup*, made over fifty years ago by Dr. Coxe's family, and sold at his residence north-east corner of Broad and Pine streets, in this city. The syrup was subsequently admitted into the Pharmacopœia, and is still recognized as *syrupus scillæ compositus.*

Prof. Maisch exhibited a specimen of *Sumatra Benzoin*, of handsome appearance, and yet the sample proved to contain 33 per cent. of bark and woody matter, which was left behind on preparing the tincture of benzoin; he said that in many cases it was impossible to form any opinion of the quality of resins and gum resins by mere appearance.

Prof. Trimble stated that one of the students had examined *scammony resin* in connection with matter for his thesis, and had found that nearly all the scammony of commerce contained starch, and that the sample in the College cabinet was fully up to the standard required by the Pharmacopœia.

On motion adjourned.

T. S. WIEGAND, *Registrar.*

ALUMNI ASSOCIATION, PHILADELPHIA COLLEGE OF PHARMACY.

The last social meeting of the present term was held in the Museum of the College February 10, C. C. Meyer, Ph.G., occupying the chair.

Rev. R. B. Westbrook, D. D., delivered an interesting lecture on "The origin of some familiar things," including a number of matters of special interest to the apothecary.

John E. Cook, Ph.G., read two papers entitled "How to experiment in Natural Philosophy," and "Chlorophyll," dwelling in the latter upon the conditions under which the green color is produced, and upon various researches into its composition.

SIXTH INTERNATIONAL PHARMACEUTICAL CONGRESS.

Under the High Protection of His Majesty the King of the Belgians, And the Honorary Presidency of the Minister of the Interior and of Public Instruction, and the Honorary Vice-Presidency of the Burgomaster of the City of Brussels.

General Rules of the Congress.

Object of the Congress.

Art. 1. The Sixth International Pharmaceutical Congress will be held in Brussels from the 31st of August to the 6th of September, 1885.

Art. 2. The object of the Congress is to follow up the work commenced in 1865 at Brunswick, and continued in 1867 at Paris, in 1869 at Vienna, in 1874 at St. Petersburg, and in 1881 at London.

The Congress will be able to discuss all questions which are connected with the profession of the pharmacist, the progress of the pharmaceutical sciences and their application to hygiene.

It will exclude from its business all that is foreign to these subjects. Governments, academies, universities and schools of pharmacy, chemistry, hygiene, etc., are invited to lend their co-operation in this work and to cause themselves to be represented in the Congress by delegates.

Business of the Congress.

Art. 3. The Congress will group in four sections all the questions which shall be submitted to it by pharmaceutical societies or persons who have connected themselves with the Congress.

(*a*). Professional questions.

(*b*). Questions of theoretical or practical pharmacy.

(*c*). Questions of chemistry in its relations with hygiene and the public health.

(*d*). Questions relative to applied, biological and legal chemistry.

Art. 4. Four questions will be submitted by the Committee of Organization for discussion in the full general meetings. These are:

1°. Examination of the scheme of an International Pharmacopœia elaborated by the Commission nominated at the time of the last Congress in London.

2°. Pharmaceutical Education: The attainments that should be preliminary to pharmaceutical studies: the scientific pharmaceutical studies; the professional applications.

3°. Sophistications of alimentary substances: legislation, administrative service, etc.

4°. Potable waters: The characters of potable waters. The best practical processes, in the actual state of science, to be recommended for the verification of these characters.

Art. 5. The Congress will pursue its objects by means of (*a*) discussions in meetings; (*b*) the publication of its transactions; (*c*) conferences or experimental demonstrations which may be organized during the continuance of the Congress.

The Sessions.

Art. 6. The Congress will last during six days. There will be two sittings each day. The morning will be devoted to the meetings of the sections; the afternoons to the general meetings.

Art. 7. Independently of the sittings of the sections and the general meetings there will be two special reunions: one at the opening and the other at the close. In the first the Committee of Organization will proceed to the nomination of the definite committee of the Congress and the committees of the sections; in the second it will give an account of all the business transacted.

Art. 8. The sections will discuss the questions set down on their orders of the day by the Committee of Organization. During the continuance of the Congress, however, other questions may be introduced at the close of the orders of the day of the sections upon the initiative of the members and with the consent of the committees.

Art. 9. In the general meetings the discussions will be devoted to reports prepared beforehand. In the sections they will turn upon the communications presented by the members of the Congress.

These reports or communications may consist in expositions of facts or of points of doctrine. Those who bring them forward will assume the responsibility for them.

Except by authorization of the meeting the same speaker will not be able to speak more than twice upon the same subject, and the length of speeches, readings of communications, memoirs, etc., will not be allowed to exceed fifteen minutes. This rule is not applicable to the reporters.

No memoir already published or communicated to a scientific society will be allowed to be read at a sitting.

Art. 10. Although the sessions will be conducted in the French language, the speakers will have liberty of choice as to language for their speeches or communications. In this case, the members who do not express themselves in French will remit an entire translation or a summary of their speeches

to the secretaries of the sittings, and as far as possible the sense of their words will be translated immediately and summarily by one of the members of the meeting.

Publication of the Transactions.

Art. 11. The Committee of Organization is charged with the publication of the account of the labors of the Congress. It will decide as to the total or partial insertion or non-insertion of memoirs, communications, etc.

Composition of the Congress.

Art. 12. The Congress will be composed of all persons, pharmacists and others, who shall pay a subscription of ten francs and who have sent a notice of their adherence.

Art. 13. All the members will have the right to take part in all the labors and deliberations of the Congress, and they will receive the publications.

Art. 14. The Committee of Organization will constitute the provisional committees of the sections. These will elect their definitive committees.

General Arrangements.

Art. 15. The committee will receive with gratitude all publications and communications, which will be acknowledged. The *compte rendu* will make mention of these remittances and the Committee will be able to communicate them to the Congress.

Art. 16. A special regulation, to be agreed to later on, will determine the supplementary executive measures to be taken to insure the satisfactory progress of the work of the Congress. A special bulletin will publish the orders of the day and the *procès-verbaux* of the session; it will give besides, if there be occasion, notices as to excursions, *fêtes*, and in general, all information useful to members of the Congress.

Agreed to at a sitting of the Committee of Organization of the Sixth International Pharmaceutical Congress, December 20th, 1884.

On behalf of the Committee,

D. Van Bastelaer, *President.*
E. Van de Vyvere, *General Secretary.*

—*Phar. Jour. and Trans.*, Jan. 31, 1885, p. 618.

EDITORIAL DEPARTMENT.

The School of Pharmacy of the University of Michigan.—The following communication from Prof. Prescott explains itself.

Editor of the American Journal of Pharmacy:

In the article of Mr. William B. Thompson on "Advantage of Preliminary Education," a reference is made, on page 75, to the School of Pharmacy of the University of Michigan, beginning as follows: "There has been a steady growth of business rivalry in the more prominent pharmaceutical institutions of this country; some have wisely withdrawn from all competitive effort, and such a course has been received with approval. The future work and standing of these institutions will give ample evidence of

a wise foresight. The University of Michigan was the first institution in this country, we believe, to take the long bold stride of graduating pharmacists without any requirement of preliminary educational or shop training." As this paragraph may meet the eye of pharmacists not acquainted with the requirements of preliminary training in the School of Pharmacy at Ann Arbor, I desire to state that its entrance standard is that of a good high school education. The examination covers—for those taking the college training *before* experience in the shop—three years' schooling in Latin and German, algebra through quadratic equations, botany and elementary physics, beside arithmetic through involution and evolution, and the correct writing of English. For those taking the college course *after* apprenticeship in the shop—the examination covers one years' schooling in Latin or German, with algebra, arithmetic, and correct English writing. Under the stringency of these examinations, fully two-thirds of the admissions to the school are gained by diplomas of graduation in high schools giving preparation for academic colleges. *This* is "the step in the methods of rivalry" taken at Ann Arbor. It is, in truth, a "long and bold stride" in preliminary examination in pharmacy in the United States.

Regarding the non-requirement of apprenticeship by this school—the cause of action of the American Pharmaceutical Association in 1871, and the chief test of the "Convention of Teaching Colleges of Pharmacy," the position of the University of Michigan, whether it be right or whether it be wrong, is not correctly represented by Mr. Thompson. It is that, in this country, it would be quite as useful *to require the college course* (preliminary examination and all) *before the apprenticeship*, as *to require the apprenticeship before the college course.* The diploma of this school is stated to give evidence of college training only, with no disparagement of the shop training, the variable value of which is to be expressed by the certificates of the shop itself.

Mr. Thompson adds a reference to "educating scientific experts, drug assayers, toxicologists, etc.; presuming such to have been a *bona fide* intention," he asks, "would the country find need of so many men to fill positions only casually made necessary?" This question, asked in skepticism by the writer, is answered in good faith by the "Register of Residences and Occupations of the Alumni," published annually by the school in question. The larger proportion of the graduates, in accord with the controlling design of the school, are engaged in dispensing pharmacy, where, in spite of "the groundling and mercenary spirit" lamented by Mr. Thompson, they find every year greater demand for the duties of "drug assayers, etc." With our requirements for entrance, and our severe and sifting college course, holding every student from six to eight hours a day in college from the last week in September to the last week in June, during both years, the numbers of our graduates are not "so many men" as to be open to the objection of "augmenting the ranks of pharmacy," but by virtue of quality, they are felt as a distinct force in pharmaceutical practice.

ALBERT B. PRESCOTT, *Dean.*

UNIVERSITY OF MICHIGAN, SCHOOL OF PHARMACY,
Ann Arbor, February 23, 1885.

THE SIXTH INTERNATIONAL PHARMACEUTICAL CONGRESS will be held during the coming summer in the city of Brussels, and a series of rules for its government have been drafted, which we publish on another page. A Committee on organization has been formed consisting of prominent Belgian pharmacists, under the presidency of Mr. Van Bastelaer, the president of the General Pharmaceutical Association of Belgium, and of the Pharmaceutical Union of Charleroi. Professors N. Gille, J. Stas and other well-known scientists are honorary members of this Committee. In a preliminary circular dated December 20, 1884, the Committee state that the Congress is intended to be an arena open to all progressive ideas, and its rostrum accessible to all who wish to make known their discoveries or the result of their observations or labors. Besides the questions published elsewhere, other subjects, generally interesting to pharmacists, may be added if proposed by pharmaceutical societies or by adherents to the Congress. Such questions should be sent at as early a date as possible to the general Secretary, E. Van de Vyvere, 14 Montagne aux Herbes-potagères, Bruxelles, to whom also declarations of adherence (for membership) should be addressed (see General Rules, Art. 12).

At the International Congress held in London in 1881 it had been decided that the next Congress should assemble in Brussels in 1884; but it was deemed advisable to postpone it until the present year, one of the main reasons being, that the universal exhibition to be held at Antwerp would be a great attraction to strangers, and secure a larger attendance at the neighboring city of Brussels, which from Antwerp can be reached by rail in about one hour.

It will be remembered that in London an International Committee was organized charged with compiling an international pharmacopœia with the view of equalizing the strength of all potent drugs and their preparations; this Committee has done some work in submitting propositions, the compilation to be elaborated by the chairman, Mr. A. von Waldheim, Vienna, Austria. To what extent this work has progressed, we have not been informed.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Proceedings of the Third Annual Session of the Alabama Pharmaceutical Association, held in the city of Montgomery, May 13, 1884. 8vo, pp. 31.

The next meeting will be held in Anniston, in the northern part of the State, on the first Tuesday in May. The Local Secretary is Jas. N. Gunnel, Oxford. The other officers are: President, P. C. Candidus, Mobile. Vice-Presidents—J. B. Collier, Opelika; A. L. Stollenwerck, Birmingham, and E. P. Galt, Selma. Secretary, M. M. Stone, Montgomery.

Proceedings of the Ohio State Pharmaceutical Association, at its Sixth Annual Meeting, held in Cincinnati, May, 1884. 8vo, pp. 181.

A brief account of the transactions at this meeting was published on page

396 of our last volume. The next meeting will be held at Sandusky, on the third Wednesday of May next, M. M. Melville, of Sandusky, being the Assistant Secretary.

The following Reports of State Boards (Commissioners) of Pharmacy for the year 1883–1884 have been received:

Illinois.—Pp. 78. With a list of the Registered Pharmacists and Assistant Pharmacists; also, a list of cases prosecuted during the year ending June 30, 1884.

Maine.—With the draft of a law amending the Pharmacy Act of 1877.

West Virginia.—Ten Registered Pharmacists have been stricken from the register for unlawfully selling spirituous liquors.

L'Université de Bruxelles. Notice historique faite à la demande du Conseil d'Administration. Par L. Vanderkindere, Professeur à la Faculté de Philosophie et Lettres. Bruxelles: P. Weissenbruch, 1884. 8vo, pp. 440. The University of Brussels. Historical Notice.

On November 20, 1834, the Free University of Belgium, since 1842 known as the Free University of Brussels, was inaugurated. The handsome volume before us gives a full account of the work done during the fifty years of the existence of the University, which was founded by the liberality of a number of Belgian citizens. During the time named 394 pharmacists completed their education in this institution.

One Hundred Years of Publishing. 1785–1885. Philadelphia: Lea Bros. & Co.

This neat publication gives a succinct history of the publishing house of Mathew Carey, who in January, 1785, commenced issuing "The Pennsylvania Evening Herald," and in a few years added to this two monthly magazines and various books. His successors, in 1829, divided the business, Edward L. Carey taking the retail business, forming the firm of Carey & Hart, the present successors of which are Henry Carey, Baird & Co. The publishing business was retained by Carey & Lea; their successors, Lea & Blanchard, between 1840 and 1850 gradually withdrew from publishing works of fiction and other books, concentrating their attention on works relating to medicine and allied sciences. It is stated that the house had never lost a partner by death, all its members having successively withdrawn in season to enjoy the fruits of well directed industry. Two of the members of the present firm, which was formed at the beginning of the second century after the foundation of the house, are descendants of its founder, Mathew Carey.

Flora of Southern and Lower California. By Chas. Russell Orcott. San Diego, California: 1885. Pp. 13.

This pamphlet is issued as a check list of the flowering plants, ferns and other cryptogams of San Diego County and the adjacent borders of Lower California. The distribution of the plants and other matters of interest are indicated, enhancing the value of this list.

Journal of Mycology. Edited by W. A. Kellermann, Ph.D., Professor in the Kansas State Agricultural College, Manhattan, Kansas; assisted by J. B. Ellis, Newfield, N. J., and B. M. Everhart, West Chester, Pa. Price $1 per annum.

This is a new monthly, devoted to fungi and the current literature pertaining to the subject. Judging from the initial number it will be a valuable repository of mycological science in general, and of special importance to the North American students of mycology.

Babyhood. Devoted exclusively to the care of infants and young children, and the general interests of the nursery. Edited by L. M. Yale, M. D. and Marion Harland. New York. Price $1.50 a year.

A new monthly, well printed and handsomely illustrated. The number before us speaks well for the manner in which the objects are to be carried out.

Annual Summary of Engineering and Industrial Progress, 1884.

A reprint of the report of the Secretary of the Franklin Institute.

International Electrical Exhibition, 1884. Reports of Examiners of Section xviii (underground conduits) and of Section xxi., (fire and burglar alarms and annunciators).

These reports covering respectively fifty-five and sixteen pages are reprints from the Journal of the Franklin Institute.

Official Report of the Trustees and Officers of the State Hospital for the Insane, at Danville, Pa. from October 1, 1882 *to Septembr* 30, 1884. 8vo, pp. 51.

Acetate of Lead in Ocular Therapeutics. By David DeBeck, M. D., assistant to the chair of ophthalmology.

Contributions from the ophthalmic clinic, Medical College of Ohio, Cincinnati.

OBITUARY.

WILLIAM A. GELLATLY died in New York, February 13, at the age of fifty-four years. Born in Edinburgh, he came to this country when four years old, and at the age of thirteen he entered the house of W. H. Schieffelin & Co., as an errand boy, rising through various positions to that of a partner in 1860. His entire career was marked by strict integrity and honorable generosity.

JOHN P. BINNS, a graduate of the Philadelphia College of Pharmacy, Class 1882, died in this city December 2, 1884, in the 24th year of his age.

WILLIAM BRAITHWAITE, M. D., died in Leeds, England, January 31, aged seventy-eight years. Since 1840 he edited the "Retrospect of Medicine," which is published in half-yearly volumes, and which will now be continued under the editorial charge of his son, Dr. James Braithwaite.